LOS ANGELES
NOV-3-'66
CALIF.
U.S. POSTAGE
.24
P.B. METER 332908

VIA AIR MAIL

DIGITEK
6151 WEST CENTURY BLVD. • LOS ANGELES, CALIF. • 90045

ANOTHER Datamation READER INQUIRY

B T NELSON
SYSTEMS CONSULTANT
BOX 1546 ADV
POUGHKEEPSIE
NEW YORK 12603

SIMPLICITY IS COMPLEX

A complex subject contains within it a myriad of nuances and hidden meanings. When the subject is reduced to its very essence, when it is presented as a simple, clean statement, the result is beautiful. Witness a Brancusi sculpture, the Schrodinger wave equation, a pre-Columbian figure, the periodic table of elements, a Shakespearean sonnet, the pyramids, the Constitution of the United States, a Bach fugue.

Also witness Digitek compilers.

This business of building compiling systems is difficult and little understood. A system utilizing long, tedious algorithms is easier to design but expensive to implement and impossible to check out.

What is needed is purity with integrity of structure.

How Digitek achieves this level of perfection is more of an art than a science. It takes exceptional people. Creative people. People with simple answers. People with guts.

Digitek people.

Through a penetrating and practical understanding of recursion and interpretation, Digitek has developed a unique technology which *inherently* results in five major advantages: reliability, size, speed, delivery and price.

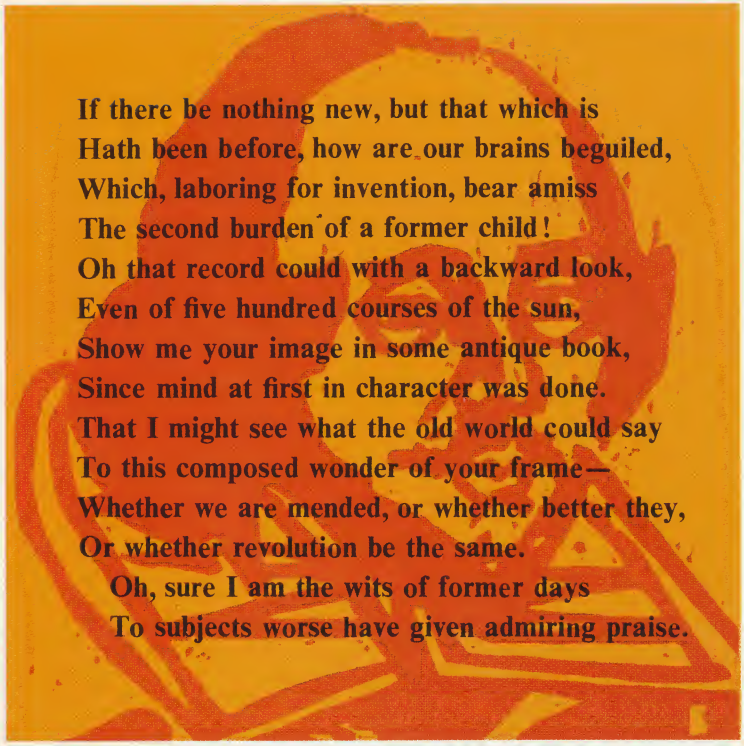
How Digitek goes about this is important (if only for your believability alone).

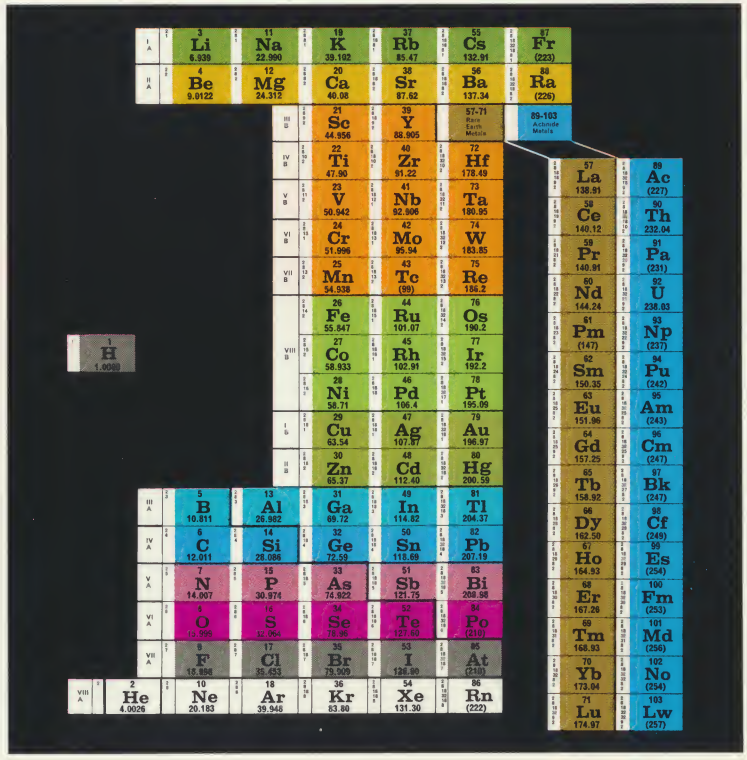
Digitek separates the compiler into two sections.

The Translator: a step-by-step specification of translation from the source language to the object computer.

The Interpreter: a step-by-step interpretation for the compiling computer of each of the steps within the translator.

The translator is written in a language which is machine-like but machine independent. This language, an exclusive Digitek development, is called POP (which stands for Programmed Operators and Primitives, and is easy to say with your mouth full). In short, POP is the language of a hypothetical computer designed specifically for compilation purposes.





The interpreter, on the other hand, is so simple it might even be called old-fashioned. Within this section of the compiler we equate the hypothetical computer with the computer actually being used for compilation.

Through this system, Digitek achieves an extraordinary degree of flexibility. For instance.

Since POP is clear and easy to understand, the translator is clear and easy to understand. Modifications are, therefore, easily and reliably made. Since the effects of changes in either the source language or the object computer tend to be localized, we can, therefore, treat a delivered, proven compiler as an excellent model for a new compiler.

In many instances, Digitek finds that it can utilize major portions of existing compilers in the production of new compilers. The discipline imposed by POP assures us of interface compatibility of parts.

It is almost an "off-the-shelf" approach. And the natural result is a drastic reduction in errors and construction time.

The Digitek technique also insures a significant reduction in the time and employee dislocations of debugging. Using our own POP interpreter, we check out the translator on Digitek's in-house computer. After delivery, errors found in the field can be quickly verified and corrected.

The simplicity of the delivered interpreter allows Digitek to use equally simple yet comprehensive procedures for checkout of the interpreter on the customer's computer. The time required on the customer's computer is, therefore, minimized.

Digitek's compiler technology has caused a literal revolution in the computer software field, primarily because of the concrete advantages it provides.

Reliability The Digitek technique absolutely insures an extremely low error rate—4 to 20 times better than the best competitive compilers delivered to date. The proof of the pudding is, of course, in the eating. Three errors have been found in a FORTRAN IV compiler after six months of very heavy use. The best case to date has been no errors in a FORTRAN II compiler after two years.

If that's not enough for our competition to shoot at, how about twenty errors in a full language PL/1 compiler?

By the way, we fix all errors free of charge for two years after delivery. It doesn't cost us very much.

Size This is where Digitek shines. By reducing highly complex algorithms to their most simple common denominators, we have been able to produce one-pass FORTRAN IV compilers which operate in 4,096 words of core with no backup memory. Digitek's full language PL/1 compiler, which produces highly optimized object code and operates in a conversational environment, has a maximum phase size of 7,000 words and a total size of only 25,000 words.

In many cases, Digitek has developed compiling systems one-fifth the size of anything equally powerful. Not exactly on the head of a pin yet, but we feel comfortable in inviting comparison.

Speed Generally speaking, interpretive compilers are considered to be somewhat slow. With Digitek, the opposite is the case. The small size and clean organization of our compilers make it easy for us to identify the time dominant core of manipulation. Once identified, we design to it. In a vast majority of cases, we are dealing with only 5% of the compiler to achieve 90% of the speed. Would you like to try 50% faster on for size? Digitek once set forth in a proposal: "Happiness is not feeding a 4,000 sta./min. compiler into a 400 sta./min. loader." And this is why Digitek prefers to handle the entire compilation system: assembler, compiler, library, loader, conversational handler, and supervisor. Fast thinking.

Delivery This is the mysterious magnitude of comparison. Apples and oranges. Camels and horses. Digitek (and, by the way, its many customers) feels that it can adhere to previously unheard of delivery schedules. Again, the "off-the-shelf" approach insures it. Conversational time-shared full language

$$\left[-\frac{\hbar^2}{2m}\nabla^2 + V\right]\psi = i\hbar\frac{\partial}{\partial t}\psi$$

We the People

of the United States, in Order to form a more perfect Union, establish Justice, insure domestic Tranquility, provide for the common Defence, promote the general Welfare, and secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish this CONSTITUTION for the United States of America.

Article. I.

SECTION 1. All legislative Powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

SECTION 2. The House of Representatives shall be composed of Members chosen every second Year by the People of the several States, and the Electors in each State shall have the Qualifications requisite for Electors of the most numerous Branch of the State Legislature.

No Person shall be a Representative who shall not have attained to the Age of twenty-five Years, and been seven Years a Citizen of the United States, and who shall not, when elected, be an Inhabitant of that State in which he shall be chosen.

[Representatives and direct Taxes shall be apportioned among the several States which may be included within this Union, according to their respective Numbers, which shall be determined by adding to the whole Number of free Persons, including those bound to Service for a Term of Years, and excluding Indians not taxed, three fifths of all other Persons.] The actual Enumeration shall be made within three Years after the first Meeting of the Congress of the United States, and within every subsequent Term of ten Years, in such Manner as they shall by Law direct. The Number of Representatives shall not exceed one for every thirty Thousand, but each State shall have at Least one Representative; and until such enumeration shall be made, the State of New Hampshire shall be entitled to chuse three, Massachusetts eight, Rhode-Island and Providence Plantations one, Connecticut five, New-York six, New Jersey four, Pennsylvania eight, Delaware one, Maryland six, Virginia ten, North Carolina five, South Carolina five, and Georgia three.

When vacancies happen in the Representation from any State, the Executive Authority thereof shall issue Writs of Election to fill such Vacancies.

The House of Representatives shall chuse their Speaker and other Officers; and shall have the sole Power of Impeachment.

SECTION 3. The Senate of the United States shall be composed of two Senators from each State, chosen by the Legislature thereof, for six Years; and each Senator shall have one Vote.

Immediately after they shall be assembled in Consequence of the first Election, they shall be divided as equally as may be into three Classes. The Seats of the Senators of the first Class shall be vacated at the Expiration of the second Year, of the second Class at the Expiration of the fourth Year, and of the third Class at the Expiration of the sixth Year, so that one-third may be chosen every second Year; and if Vacancies happen by Resignation, or otherwise, during the Recess of the Legislature of any State, the Executive thereof may make temporary Appointments until the next Meeting of the Legislature, which shall then fill such Vacancies.

No Person shall be a Senator who shall not have attained to the Age of thirty Years, and been nine Years a Citizen of the United States, and who shall not, when elected, be an Inhabitant of that State for which he shall be chosen.

The Vice President of the United States shall be President of the Senate, but shall have no Vote, unless they be equally divided.

The Senate shall chuse their other Officers, and also a President pro tempore, in the absence of the Vice President, or when he shall exercise the Office of President of the United States.

The Senate shall have the sole Power to try all Impeachments. When sitting for that Purpose, they shall be on Oath or Affirmation. When the President of the United States is tried, the Chief Justice shall preside: And no Person shall be convicted without the Concurrence of two thirds of the Members present.

Judgment in Cases of Impeachment shall not extend further than to removal from Office, and disqualification to hold and enjoy any Office of honor, Trust or Profit under the United States: but the Party convicted shall nevertheless be liable and subject to Indictment, Trial, Judgment and Punishment, according to Law.

SECTION 4. The Times, Places and Manner of holding Elections for Senators and Representatives, shall be prescribed in each State by the Legislature thereof; but the Congress may at any time by Law make or alter such Regulations, except as to the Place of Chusing Senators.

The Congress shall assemble at least once in every Year, and such Meeting shall be on the first Monday in December, unless they shall by Law appoint a different Day.

SECTION 5. Each House shall be the Judge of the Elections, Returns and Qualifications of its own Members, and a Majority of each shall constitute a Quorum to do Business; but a smaller number may adjourn from day to day, and may be authorized to compel the Attendance of absent Members, in such Manner, and under such Penalties as each House may provide.

Each House may determine the Rules of its Proceedings, punish its Members for disorderly Behavior, and, with the Concurrence of two thirds, expel a Member.

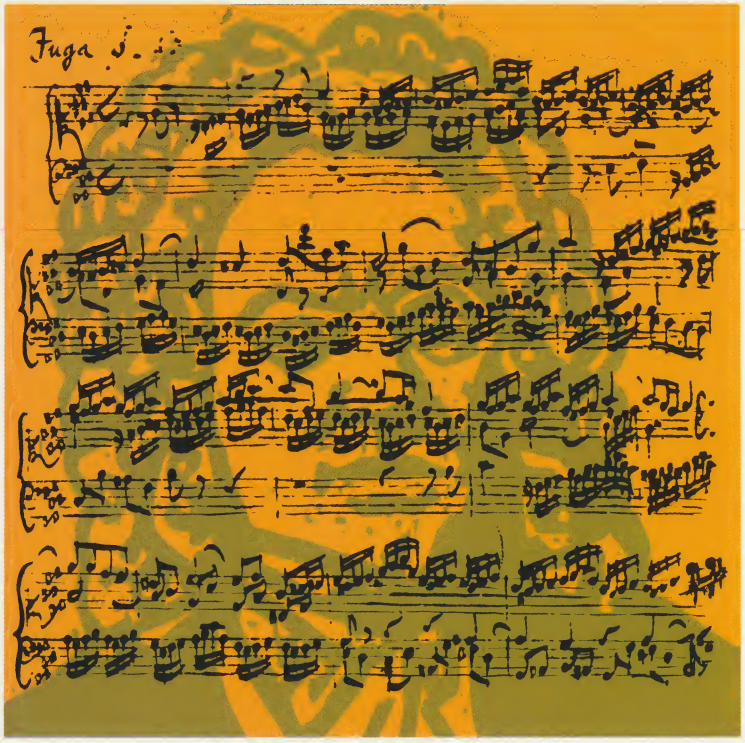
Each House shall keep a Journal of its Proceedings, and from time to time publish the same, excepting such Parts as may in their Judgment require Secrecy; and the Yeas and Nays of the Members of either House on any question shall, at the Desire of one fifth of those Present, be entered on the Journal.

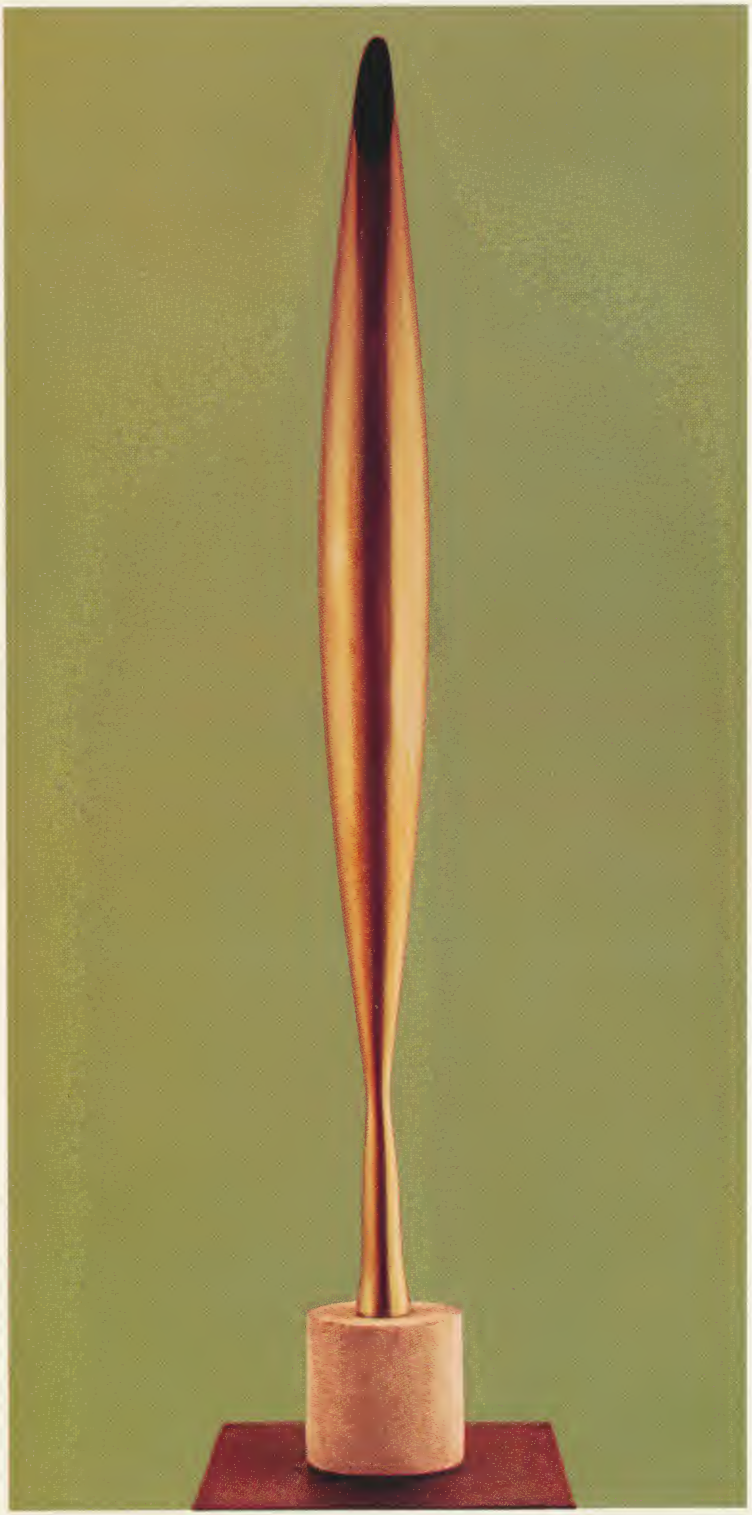
Neither House, during the Session of Congress, shall, without the Consent of the other, adjourn for more than three days, nor to any other Place than that in which the two Houses shall be sitting.

SECTION 6. The Senators and Representatives shall receive a Compensation for their Services, to be ascertained by Law, and paid out of the Treasury of the United States. They shall in all Cases, except Treason, Felony and Breach of the Peace, be privileged from Arrest during their Attendance at the Session of their respective Houses, and in going to and returning from the same; and for any Speech or Debate in either House, they shall not be questioned in any other Place.

No Senator or Representative shall, during the Time for which he was elected, be appointed to any civil Office under the Authority of the United States, which shall have been created, or the Emoluments whereof shall have been encreased during such time; and no Person holding any Office under the United States, shall be a Member of either House during his Continuance in Office.

SECTION 7. All Bills for raising Revenue shall originate in the House of Representatives; but the Senate may propose or concur with Amendments as on other Bills.





PL/1, the first ever, in 18 months. Highly efficient extended language SIMSCRIPT in eight months. One pass process control FORTRAN IV in six months. Digitek compilers are strange animals. The gestation period might vary, but nobody can deliver faster.

Price When one is working from, adapting and implementing an already existent process model, price is naturally lower. Couple this with the fact that Digitek compilation systems are developed largely on our own in-house computers...couple this with short debugging time on the customer's computer ...couple this with speed and efficiency of operation...and you're talking not just about a lower initial price but overall economy. They make a very nice couple.

The question arose the other day: why should they think we can do this?

If you refer to our customer list, you will find that Digitek has delivered an extraordinary number of compilers for a variety of languages which are now operating on many different computers throughout the world.

We don't mind your being somewhat dubious. In the initial stages of interpersonal discussion, most of our customers are. While Digitek technicians are back at the plant building a compiler, the customer might not see any of us for as long as three or four months. The "Dubious Level" rises dangerously. When the compiler is debugged and delivered, however, the customer begins to smile warmly. The system was delivered rapidly. It is small and fast. It works. It saved him money initially. It saves him money daily.

The final argument in Digitek's favor is one few people ever seem to mention. Digitek makes money. The company's growth pattern as a profitable concern is your primary assurance that the Digitek product performs to and beyond specifications.

And that is the sort of simple design we like.

Constantin Brancusi. *"Bird in Space"* Collection: The Museum of Modern Art, New York.

COMPILER SYSTEMS

(Delivered and on order as of August 22, 1966)

The following compilers and the accompanying specifications are listed to give you definitive examples of Digitek's capability.

COMPANY	COMPUTER	LANGUAGE
Bell Telephone Laboratories	GE 645	PL/1
Compagnie Europeene D'Automatisme Electronique	SDS 92	FORTRAN IV
Computing Devices of Canada	ADC 2	FORTRAN II
Control Data Corporation	CDC 3200	FORTRAN II
	CDC 636	FORTRAN II
Digital Equipment Corporation	PDP-6	FORTRAN IV
Electronic Associates Inc.	EAI 8400	FORTRAN IV
French National Post Office	Ramses II	FORTRAN IV
General Electric Company	GE 645	PL/1
	GE 625/635	PL/1
	GE 625/635	SIMSCRIPT
	GE/PAC 4000	FORTRAN II
	GE/PAC 4000	FORTRAN IV
	GE 412	FORTRAN II
	GE 412	FORTRAN II Extended
Honeywell, Inc.	H20	CONTRAN
	H20	FORTRAN II
	H610	FORTRAN II
Hughes	IBM 7094	FORTRAN IV
	H-330	FORTRAN IV
International Business Machines	IBM 360	FORTRAN IV G Level
	IBM 360	FORTRAN IV E Level
	IBM 44	FORTRAN IV G Level
National Cash Register	NCR 315	FORTRAN IV
	NCR 315	FORTRAN II
Planning Research Corporation	CP-667	JOVIAL
Scientific Data Systems	SDS Sigma 7	PL/1
	SDS Sigma 7	FORTRAN IV
	SDS 900 Series	FORTRAN IV
	SDS 900 Series	FORTRAN II
Thompson Ramo Wooldridge	TRW 230	FORTRAN II

DIGITEK

6151 WEST CENTURY BOULEVARD, LOS ANGELES, CALIFORNIA 90045, (213) 670-9040

FORTRAN IV

Produced for SDS and
Compagnie Europeene D'Automatisme Electronique
for the SDS 92 product line

only 8K 12 bit words of core required

no backup storage required

one pass

IBM FORTRAN IV Version IX

most arbitrary restrictions eliminated

no reserve words

in line symbolic diagnostics

small object program size

compile and execute 300 statement programs

good compile and execution speeds

DIGITEK

6151 WEST CENTURY BOULEVARD, LOS ANGELES, CALIFORNIA 90045, (213) 670-9040

FORTRAN IV E LEVEL

Delivered and now operating under TOS and DOS
on International Business Machines IBM 360 computer systems

24K bytes total size

8K maximum phase size in four phases

diagnostics integrated with source listing

no reserved words

compiled directly to standard loader form

formats compiled

redundant array subscript calculations eliminated over blocks

efficient use of multiple registers

very high reliability: three errors in six months

DIGITEK

6151 WEST CENTURY BOULEVARD, LOS ANGELES, CALIFORNIA 90045, (213) 670-9040

FORTRAN IV G LEVEL

Produced for IBM for
System 360 product line

All core compiler

40K bytes total size

18K bytes maximum phase size

high compilation speed

good object code efficiency

highly optimized subscript calculations

efficient use of multiple registers

multiple in line diagnostics

advanced debugging aids

predictable performance

excellent vehicle for future development

DIGITEK

6151 WEST CENTURY BOULEVARD, LOS ANGELES, CALIFORNIA 90045, (213) 670-9040

SIMSCRIPT

Delivered and in operation on General Electric Company
GE-625/635 computer systems

use in both batch and conversational environments

double precision, complex and logical arithmetic

binary input output

1500 statements a minute compile speed

24K words total size

8K max phase size

high object code efficiency

gets and puts compiled open

good diagnostics at compile and object times

debugging aids

compiles direct to binary

uses FORTRAN IV loader and library

DIGITEK

6151 WEST CENTURY BOULEVARD, LOS ANGELES, CALIFORNIA 90045, (213) 670-9040

PL/I

For the General Electric Company
GE 625/635 and GE-645 computer systems

(tentative specifications)

full language as of "—3"

produces highly optimized object code

operates in a conversational environment

conversational or batch operation

same language

same diagnostics

same answers

2K statements a minute compile speed

25K words total size

7K maximum phase size

excellent diagnostics

debugging aids

DIGITEK

6151 WEST CENTURY BOULEVARD, LOS ANGELES, CALIFORNIA 90045, (213) 670-9040